

Description of a New Species from the Brazilian Province: *Dalliconus edpetuchi*

Éric Monnier¹, Loïc Limpalaër², Christophe Roux³ and David P. Berschauer⁴

¹ Conservatoire National des Arts et Métiers (CNAM)

292, rue Saint-Martin, 75003 Paris (France)

eric.monnier@cnam.fr Phone : + 33 620270836

² 11, rue de la Poste, 60510 Haudivillers (France)

loic.limpalaer@wanadoo.fr

³ 21, rue Talma, 94400 Vitry sur Seine (France)

roux.ch@wanadoo.fr

⁴ 25461 Barents Street, Laguna Hills, California 92653

shellcollection@hotmail.com

ABSTRACT There has been much confusion regarding the taxonomy of the various species of *Dalliconus* throughout the tropical Western Atlantic. This paper reviews the extant species within the genus *Dalliconus*: *D. armiger* (Crosse, 1858), *D. mazei* (Deshayes, 1874), *D. rainesae* (Mc Ginty, 1953), *D. mcgintyi* (Pisbry, 1955), *D. bajanensis* (Nowell-Usticke, 1968), *D. pseudoaustini* (Nowell-Usticke, 1968) is a junior synonym of the precedent species, *D. guyanensis* (Van Mol, 1973), *D. pacei* (Petuch, 1987), *D. kremerorum* (Petuch, 1988), *D. lenhilli* (Cargile, 1998), *D. sauros* (Garcia, 2006), *D. roberti* (Richard, 2009), *D. coletteae* Petuch, 2013, by biogeographical provinces, ecological bathymetric zones and morphology. *Dalliconus edpetuchi* a new species from Brazil which has been known for a number of years and lumped with *D. mcgintyi* is described.

KEY WORDS *Dalliconus*, *edpetuchi*, *mcgintyi*, *mazei* complex, endemism, Brazil.

INTRODUCTION

Chronological literature review of the genus *Dalliconus* (except the *D. armiger* complex)

1874: description of *Conus mazei* by Deshayes in the Journal de Conchyliologie Vol. 22 from a unique specimen collected in Martinique Island. The holotype is in MNHN Paris. Shell is 59 mm. Crosse adds in a footnote attached to Deshayes' description that the shell was crabbed and was collected in a lobster trap in 50 "brasses" (90 m.) depth together with "*Pleurotomaria*" *quoyana*.

1884: Tryon cites the species from deep sea and gives a shell length of 60 mm. He copies Deshayes' figure.

1886: Dall in "Report on the results of dredging by the United States Coast Survey Steamer "Blake" XXIX Part II" reports findings of *Conus mazei* in Grenada (92 fathoms),

Barbados (100 fathoms) and Santa Cruz (Cuba) in 115 fathoms. He describes the shells of the Blake in these words "None of the Blake specimens are smooth. All are strongly and rather uniformly sulcate all over". These specimens belong either to *Dalliconus mcgintyi* or *D. coletteae* but this cannot be checked at present.

1942: Clench in Johnsonia n°6 presents *Conus mazei* but the accompanying pictures, showing two shells from the North of Cuba, are of *D. mcgintyi*. He gives Cuba, Virgin Islands and Lesser Antilles as range.

1953: Mc Ginty describes *Conus rainesae* from 150 miles northeast of Progreso, Yucatan, Mexico. The author carefully differentiates his new species from *C. mazei*: absence of tubercles on the shoulder of the body whorl, smoother last whorl, smaller size, shallower

depth. The author explains that he could compare *C. rainesae* with several personally live dredged specimens of *C. mazei* (indeed *D. mcgintyi* as inferred from the latter description of that species, see *infra*) from off Palm Beach.

1953: Clench in Johnsonia n° 32 gives a new locality for his *C. mazei*: Texas, off Padre Island.

1954: Abbott cites and illustrates *C. mazei* in "American Seashells". The picture is of *D. mcgintyi*.

1955: Pilsbry describes *Conus mcgintyi* in Nautilus 69 (2). Holotype is from Pensacola (N.W. Florida), paratypes are from Palm Beach, Sombrero Key Light and Key West. Pilsbry traces previous figures of the new species (in Johnsonia, 1953, and American Seashells). He gives differences between the new species and *C. mazei*. A sketch of the radular tooth is provided together with a photograph of a paratype from Palm Beach.

1964: Marsh & Rippingale show on the plate 23 a somewhat crude painting of *Conus mazei* that is indeed a specimen of *D. mcgintyi* from Florida.

1967: Van Mol, Tursch & Kempf describe (in French) *Conus mcgintyi* from Brazil. They figure one specimen and give a figure of details of the spire of last whorl sculpture. Their specimens were collected from off Northern Alagoas State south to off Porto Alegre in the state of Rio Grande do Sul. It is the first report in literature of *D. edpetuchi* n. sp.

1970: Johnsonia Clench and Bullock do not give any new information on *C. mazei* although the descriptions of *D. rainesae* and *D. mcgintyi* have been published since the last update of the West Atlantic Monograph of *Conus*.

1973: Van Mol in "Les Conidae du Surinam" reports the collection of four specimens of "*Conus mazei*" in 94 m. depth. No picture is shown. Shells probably are *D. mcgintyi*.

1976: Kaicher has three cards of members of the complex: *C. mcgintyi*, *C. mazei* and *C. rainesae* that are all considered as valid distinct species.

1977: Lozet & Petron cite *Conus mazei* p.103 but the picture is of *D. mcgintyi* (n° 175). They give a range from Gulf of Mexico, Caribbean south to Brazil. For Lozet & Pétron the species is represented in Brazil by the more rugose form "*macgintyi*". They also cite *C. rainesae* as a valid species that would be restricted to the Yucatan Peninsula.

1979: Walls synonymes *C. mazei* with *C. rainesae* and *C. macgintyi* (*sic*). He proposes to emend the name *mcgintyi* to *macgintyi* (this emendation is uncorrect). Two shells of *D. rainesae* are shown in p.703 and another in colour p.445 together with a typical *D. mcgintyi* from Pensacola, Florida. Walls is far from being certain that *C. mazei* and *C. macgintyi* (*sic*) are the same species but the lack of specimens pushes him to lump them.

1982: Abbott & Dance illustrate *Conus mazei* (p. 269) but pictures are of *D. mcgintyi* and *D. rainesae*. The latter is wrongly considered as a young carinate form.

1982: Röckel issues the card of *Conus rainesae*. He distinguishes it from both *C. mazei* and *C. mcgintyi*. He shows three specimens from the North West Coast of Florida.

1983: Okutani reports *C. mazei* from Surinam, in fact it is a giant *D. mcgintyi* (74 x 21 mm), the same specimen (the biggest known) is illustrated by Kohn (2014) in plate 16 fig. 23-24. Okutani illustrates its radula with "2 barbs distally and a knob proximally".

1984: Röckel issues the card of *Conus mcgintyi*. He distinguishes the species from both *C. mazei* and *C. rainesae*. He illustrates three shells from Yucatan (left correctly identified), Barbados (center that is indeed a *D. coletteae* of 32.5 mm.) and Florida (right correctly identified with a pattern recalling that of *D. mazei*).

1987: Petuch in "New Caribbean Molluscan Fauna" introduces *Conus pacei* from 4 specimens from Grand Bahama Island. He compares his new species with *C. rainesae* (it differs from its white and fully sculptured last

whorl), *C. mazei* and *C. mcgintyi* that he recognizes as valid. He illustrates the four species in plate 7 and specially a typical *C. mazei* from St James, Barbados, 250 m. that appears to be only the second specimen ever illustrated.

1988: Petuch describes *Conus kremerorum* from Barbados. It is compared with the sympatric *C. mazei* and with *C. pacei* from which it differs in its fewer and pitted sulci, presence of a pale orange pattern and coronated shoulder.

1994: a shell named "*Conus kremerorum*" is illustrated by Kevan & Linda Sunderland in the magazine "American Conchologist" vol. 22 (1). It is indeed a fine specimen of *D. coletteae* from St James, Barbados, 70 m.

1994: Paulmier reports *Conus mazei* in Xenophora n°68 "many shells collected between - 200 and - 300 m. outside the Bay of Fort de France (Martinique)" but he illustrates 2 small specimens of *D. mcgintyi*.

1998: Pointier & Lamy in "Guide des coquillages des Antilles" show p. 149, a 40 mm. specimen of *D. mcgintyi* from Les Saintes (Guadeloupe) wrongly identified as *C. mazei*.

1998: Cargile in his description of *Conus lenhilli* shows two specimens of *C. mazei* from Cay Bank and Mouchoir Bank of 42 mm. The specimen from Mouchoir Bank (Turk & Caicos) is most probably *D. mcgintyi*, the other a true *D. mazei*.

2004: Gracia, Ardila and Diaz record *Conus mazei* from Colombia from 40 specimens. They also cite Bayer (1970) with a record from the Gulf of Uraba. No figure nor description is given. It is probably *D. mcgintyi* but this needs confirmation because other species may be involved too.

2006: Garcia describes *Conus sauros* in Novapex Vol 7(2-3). He compares the new species with *C. mazei* and its form *mcgintyi* thus considering these two as synonyms.

2008: Robin in "Encyclopedia of Marine Gastropods" illustrates p. 417 a shell of "*Conus*

mazei mcgintyi" from Brazil. It is indeed *D. edpetuchi*. n.sp. In p. 426, fig. 9 a correctly identified *D. rainesae* is pictured.

2009: Massemin, Lamy, Pointier and Gargominy in « *Coquillages et escargots de Guyane* » represent (p 196-197) a *D. roberti* from Guadeloupe misidentified as a *mcgintyi*.

2009: Richard describes a new species from Guadeloupe, *Conus roberti*. He places it in *Fusiconus* da Motta, 1991 together with *C. mcgintyi* (*sic*), *C. mazei*, *C. pacei* and *C. rainesae*. The holotype was found in 300 m. In the plate are shown a specimen of *D. rainesae* from Martinique which represents an important range extension, a specimen of *C. mcgintyi* (*sic* again) from Basse Terre and a true *C. mazei* from Marie Galante (Guadeloupe). For Richard, *C. mcgintyi* (*sic*) is a species ranging from southern Florida to Brasil.

2009: Tucker & Tenorio introduce the genus name *Dalliconus* with *D. mcgintyi* as type species. The genus also contains the following extant species: *armiger*, *bajanensis*, *guyanensis*, *lenhilli*, *mazei*, *pacei* and *rainesae*. It is characterized by an elongate to biconical shape, two or more cords on the early spire whorls, the presence of ridges and sulci on the body whorl and a paucispiral spire. The radular teeth of *D. mcgintyi* and *D. armiger* are illustrated. They observe that the genus is West Atlantic in geographic range. They report that *D. armiger* and *D. mcgintyi* (from Brazil) have been found with remains of Polychaetes in their digestive tract.

2011: Tucker in "The Cone Collector" n°14a reviews Danker Vink's work on West Atlantic Conidae. Unfortunately the latter has not covered the "*mazei* complex". Tucker recognizes as valid species: *D. sauros* (with some doubts), *D. mazei*, *D. mcgintyi*, *D. rainesae*, *D. pacei*. *D. roberti* is made a Brazilian synonym of *D. mcgintyi* (although Richard never cites Brazil among the localities for his new species) and *D. kremerorum* is

lumped with *D. pacei*.

2013: Tucker places within the *Dalliconus* species found in Florida: *D. mcgintyi* and *D. rainesae*. He explains clearly the conchological characters that allow to differentiate the two species. *D. sauros* is absent from Floridan waters.

2013: Petuch in "Biogeography & biodiversity of Western Atlantic Mollusks" describes *Dalliconus coletteae* (p. 220 and fig. 9-6 F & G). He gives the species as endemic from Barbados. Type locality is St James, Barbados. He compares it with *D. mcgintyi* and *D. roberti*.

2013: Tucker & Tenorio recognized *Dalliconus mazei*, *D. mcgintyi*, *D. pacei*, *D. kremerorum*, *D. rainesae*, *D. roberti* and *D. sauros* while *D. coletteae* is a synonym of *D. mcgintyi*.

2014: in Puillandre *et al.* phylogeny of the Conidae, a specimen is identified as *Conasprella (Dalliconus) mazei*. However from the picture of the sampled specimen (in Puillandre's presentation in the first International Cone Meeting in 2010, Stuttgart) and locality (Yucatan) of the shell it is indeed a specimen of *D. mcgintyi*. The phylogenetic tree places *Dalliconus* as sister to the Indo Pacific group *Fusiconus*.

2014: Alan Kohn considers *C. mazei*, *C. mcgintyi* and *C. roberti* as belonging to the same species. He gives as range: North Carolina, Southern Florida, Gulf of Mexico, Greater and Lesser Antilles, Belize to Panama, and from Colombia to Suriname, then south to Rio Grande do Sul, Brazil. He also accepts *C. rainesae* with *C. pacei* as a synonym. The range of the latter species is Eastern Gulf of Mexico, Yucatan, (*rainesae* sensu stricto) and Bahamas (*pacei*); two shells from Colombia and Venezuela need confirmation (*pacei* type). Finally he recognizes *Conus sauros* as a valid species from scattered localities in the Western Gulf of Mexico.

The *Dalliconus* complexes and their geographical distribution

The named species of *Dalliconus* are all found in moderately deep to deep water, and several of the species appear to be endemic in an ecological subprovince (Petuch, 2013; Tucker & Tenorio, 2013). The observed protoconches of *Dalliconus* members are paucispiral. This probably involves a direct development of the hatchling without pelagic larval stage and dispersal is therefore limited (Tucker & Tenorio, 2009; Tucker & Tenorio, 2013; Petuch, personal communication). In these conditions, it is quite surprising that several species (*D. mcgintyi*, *D. edpetuchi* n. sp. eg.) exhibit ranges extending in several subprovinces. More studies are needed to elucidate these questions.

The tropical Western Atlantic Region from Cape Hatteras, North Carolina, United States, south to Mar del Plata, Argentina, encompasses different marine faunal regions (the Carolinian, Caribbean, and Brazilian), each of which has mainly its own separate fauna of conoidean gastropods (Petuch, 2013). A brief review of the tropical Western Atlantic *Dalliconus* species and their distributions in these marine faunal regions follow.

Carolinian Molluscan Province - continental shelf species

- 1) *Dalliconus armiger* (Crosse, 1858) (22-39 mm) is found in moderately deep water (40- 100 m) from West Florida in the Georgian subprovince to northern Mexico in the Texan subprovince.
Taxonomic status: a valid species.
- 2) *Dalliconus sauros* (Garcia, 2006) (15-30 mm) is found in moderately deep water (28- 140 m) along the Suwannean

subprovince to Campeche, Mexico, in the Texas subprovince.

Taxonomic status: a valid species.

Carolinian & Caribbean Molluscan Provinces - continental shelf & insular species

- 3) *Dalliconus mcgintyi* (Pilsbry, 1955) (24-74 mm) is found in deep water (125-600 m) from Cape Hatteras, North Carolina in the Georgian subprovince to the Yucatan Peninsula, Mexico, in the Yucatanian subprovince to Surinam through the continental Coast of Gulf of Mexico and Central America, Colombia and probably Venezuela and through the entire Antilles (Caribbean Province).

Taxonomic status: a valid species.

- 4) *Dalliconus rainesae* (McGinty, 1953) (14-27 mm) is found in moderately deep water (54-144 m) from Western Florida in the Georgian subprovince to Progreso, Mexico in the Yucatanian subprovince and Martinique (see Richard, 2009) and may be Venezuela (see Kohn, 2014).

Taxonomic status: a valid species.

- 5) *Dalliconus pacei* (Petuch, 1987) (19-20 mm) is found in deep water (125-250 m) off the coast of Grand Bahama Island, Bahamas, in the Bahamian subprovince, in Guadeloupe in the Grenadian subprovince (from shells collected by MNHN, under study by Richard), and in Arrecife Alacranes, Yucatanian subprovince (Kohn, 2014).

Taxonomic status: a valid species.

Caribbean Molluscan Province - insular species

- 6) *Dalliconus mazei* (Deshayes, 1874) (33-59 mm) is a species found in deep water (150-270 m) from the lesser Antilles: Martinique, Guadeloupe, and Barbados

and along the eastern edge of the Granada trough to Curacao in the Grenadian subprovince to Florida Keys (Kohn, 2014) in the Carolinian Province through the Virgin Islands (Antillean subprovince).

Taxonomic status: a valid species.

- 7) *Dalliconus coletteae* Petuch, 2013 (20-33 mm) is an endemic species found in deep water (140- 300 m) off St. James, Barbados, in the Grenadian subprovince.

Taxonomic status: a valid species.

- 8) *Dalliconus kremerorum* (Petuch, 1988) (18 mm) is an endemic species only known to us from the holotype and needs more material to be ascertained in its characters. The holotype was found in 70 m. off St James, Barbados in the Grenadian subprovince.

Taxonomic status: probably a valid species.

- 9) *Dalliconus lenhilli* (Cargile, 1998) (27-40 mm) is an poorly known endemic species found in deep water (440 m) off Mouchoir Bank, Southeast of the Turks and Caicos Islands, in the Bahamian subprovince.

Taxonomic status: a valid species.

- 10) *Dalliconus roberti* (Richard, 2009) (52-69 mm) is a poorly known species found in very deep water (300-550 m) off the coast of Guadeloupe and Virgin Islands in the Grenadian & Antillean subprovinces.

Taxonomic status: a valid species.

- 11) *Dalliconus bajanensis* (Nowell-Usticke, 1968) (29-31 mm) is an endemic poorly known species found in the South of Barbados (Shrimp trawlers), in the Grenadian subprovince.

Taxonomic status: a valid species.

Brazilian Molluscan Province

- 12) *Dalliconus guyanensis* (Van Mol, 1973) (19-28 mm) is an endemic poorly known

species found in rather deep water (75 m) off Surinam, in the Surinamian subprovince on the northern coast of South America.

Taxonomic status: probably a valid species, very close to *D. bajanensis* from which it is conchologically almost identical.

- 13) *Dalliconus edpetuchi* n.sp. (56-68 mm) is a Brazilian endemic new species found in deep water (150-400 m) from the boundary between Alagoas State and Pernambuco State (in the North) and the Rio Grande do Sul State (in the South).

The *Dalliconus* morphological complexes

The *Dalliconus* species fall into three distinct morphological complexes:

- 1) The *Dalliconus armiger* complex consists of *D. armiger*, *D. bajanensis*, and *D. guyanensis*, and the body whorl of all species in this complex have sides that are strongly convex below a broad shoulder.
- 2) The *Dalliconus rainesae* complex consists of *D. rainesae*, *D. pacei*, *D. kremerorum*, *D. lenhilli*, and *D. sauros*, and all species in this complex have thin, fragile, delicate shells with relatively straight sides. Most are relatively small.
- 3) The *Dalliconus mazei* complex consists of *D. mazei*, *D. mcgintyi*, *D. roberti*, *D. coletteae* and *D. edpetuchi* n. sp. All species in this complex (except *D. coletteae*) have relatively large sizes.

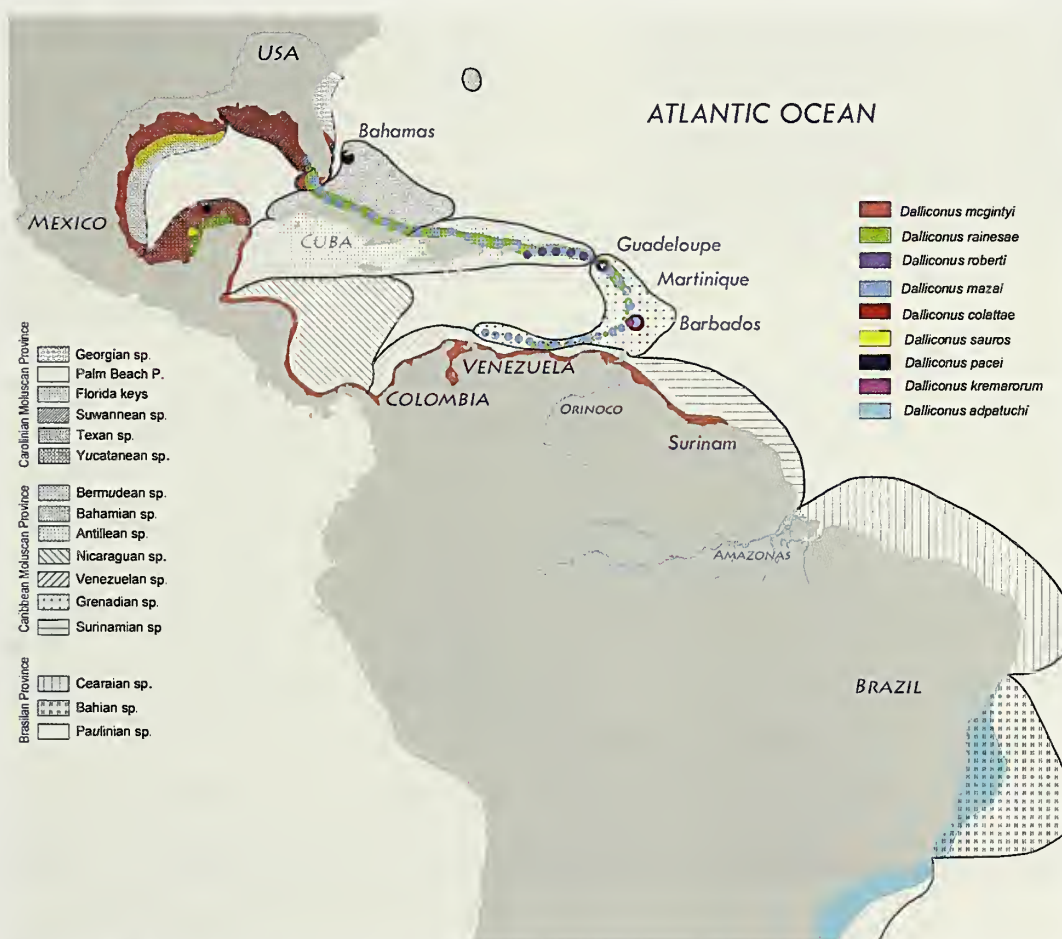


Figure 1. Biogeographical distribution map of the genus *Dalliconus*

DESCRIPTION OF A NEW SPECIES FROM THE BRAZILIAN PROVINCE:***Dalliconus edpetuchi***

	Length L	Maximum Diameter MD	Height of Maximum Diameter HMD	Aperture Height AH	Relative Diameter of last whorl $RD = MD/AH$	Position of Maximum Diameter of last whorl $PMD = HMD / AH$	Relative Spire Height $RSH = (L-AH) / L$	Deposition & Provenance
Holotype	60.32	17.14	40.77	44.14	0.388	0.924	0.268	MNHN IM-2000- 30050
Paratype 1	59.91	15.70	40.62	44.32	0.354	0.917	0.260	EM coll.
Paratype 2 ∞	65.46	14.80	39.90	42.59	0.347	0.937	0.349	EM coll.
Paratype 3	67.75	18.60	46.86	51.19	0.363	0.915	0.244	LL coll.
Paratype 4	64.77	18.06	43.79	48.40	0.373	0.905	0.253	CR coll.
Paratype 5	57.72	14.63	37.95	42.34	0.346	0.896	0.266	CR coll.
Paratype 6	62.60	17.20	-	-	-	-	-	EP coll.
Paratype 7	56.72	16.12	37.55	40.54	0.398	0.926	0.285	DB coll.
Paratype 8	64.80	18.27 °	42.62 °	46.53 °	0.393	0.916	0.282	AM coll.
Paratype 9	60.00	16.10 °	41.10 °	45.21 °	0.356	0.909	0.247	MHNLR 2015.0.1
Averages	62.0	16.7	41.2	45.0	0.37	0.92	0.27	

Table 1. Morphometric analysis of *Dalliconus edpetuchi* holotype and paratypes.

Types. Studied specimens (measurements are given in millimeters). ° : estimated values ∞ : teratological spire

Description.

The new species is moderately large (56 to 69 mm, average: 62.0 mm) and the spire varies between 24 and 35 % of the total length of the shell (with an average value of relative spire height: $RSH = 0.27$). The shell shape is very narrowly conical, fusiform / aculeiform with a very high slightly concave turrellate spire (average $AH / L = 0.73$), narrow shoulders, spiral ribs. None of the examined specimen has a perfect protoconch. Nevertheless it seems to be paucispiral with about two whorls and the new species is probably non planctotrophic. The position of the maximum diameter is 90 to 94 % of the aperture length of the shell (average $PMD = 0.92$). The relative diameter of the last whorl varies from 0.35 to 0.40 (average $RD = 0.37$). The teleoconch whorls are piled and detached with about 5 to 6 spiral grooves on the sutural ramps. At two thirds (from top to base of the shell) of each teleoconch whorl, a prominent subsutural ridge is undulated with around 25 to 30 small irregular beadlike nodules. The adult shells have about 13 to 15 whorls. The anal notch is deep and U shaped and the origin of the lip has a receding profile.

The last whorl shape has sigmoid sides, convex between the slightly subcarinated shoulder margin and the mid last whorl then concave between the mid last whorl and the base. The surface of the entire shell is covered by numerous very tight spiral ribs (around 60) separated by deep axially very finely axially striated grooves. The aperture is very long, almost straight to slightly sinusoidal and does not widen anteriorly.

The siphonal lip outline is very straight. The ground color of the shell is white. The pattern of the last whorl is made of spiral bands of irregular interrupted spiral brown blotches (giving the appearance of axial flammules). The

width of these bands is highly variable and vary from 1 mm. to more than 1 cm. The spire is white with same colour blotches rather regularly scattered.



Figure 2. Holotype of *Dalliconus edpetuchi*

Holotype.

The holotype is deposited in MNHN (Paris): MNHN IM-2000-30050. The nine paratypes are in private collections except the paratype 9 deposited in MHNLR 2015.0.1 (La Rochelle, France)

Type Locality. Off Cabo de Santa Marta Grande, Santa Catarina State, Brazil in 300-400 m.

Geographic Range. found in deep water (150-400 m) from the boundary between Alagoas State and Pernambuco State (in the North) and the Rio Grande do Sul State (in the South).

Etymology. Named for Dr. Edward Petuch in recognition of his decades of field work, many



Figure 3 - *Dalliconus edpetuchi* n. sp. **1:** *D. edpetuchi* 60.32 mm, Santa Catarina, -300-400 m, Holotype MNHN IM-2000-30050 **2:** *D. edpetuchi* 59.91 mm, Rio de Janeiro, -150 m, Paratype 1, coll. EM; **3:** *D. edpetuchi* 65.46 mm, Santos, -160-250 m, Paratype 2, coll. EM; **4:** *D. edpetuchi* 64.77 mm, Rio de Janeiro, -150 m, Paratype 4, coll. CR; **5:** *D. edpetuchi* 57.72 mm, Santa Catarina, -300-400 m, Paratype 5, coll. CR; **6:** *D. edpetuchi* 56.72 mm, Santa Catarina, -400 m, Paratype 7, coll. D. Berschauer; **7:** *D. edpetuchi* 64.80 mm, Santa Catarina, -300-400 m, Paratype 8, coll. A. Medvedev; **8:** *D. edpetuchi* 60.00 mm, Rio de Janeiro, Paratype 9, MHNLR 2015.0.1 **9:** *D. edpetuchi* 67.75 mm, Rio de Janeiro, -150 m, Paratype 3, coll. LL

discoveries and major contributions in Malacology throughout the Caribbean and Brazil.

Discussion. *Dalliconus edpetuchi*, a new endemic species described here has been erroneously lumped with *Dalliconus mcgintyi* (Pilsbry, 1955), a species found in the Carolinian and Caribbean provinces. This is the only species of *Dalliconus* living beyond the eastern edge of the Caribbean Plate. It lives in both the Bahian and Paulinian subprovinces of the Brazilian Molluscan Province (Petuch, 2013; Tucker & Tenorio, 2013; Kersten, 2014). It is geographically separated from the Caribbean species of the genus as the Lesser Antilles arc divides the fore arc basin and acts as a geological barrier to sediment passing between the Grenada Basin and South America (Aitken, *et al.*, 2011). It is interesting to notice that no *Dalliconus* is known from the Cearaian subprovince in Northern Brazil.

Dalliconus edpetuchi n. sp. is most similar in morphological shape to *Dalliconus mcgintyi* (Pilsbry, 1955) and is part of the *D. mazei* complex with elongate biconical shells, with narrow shoulders, spiral ribs and axial flammules. The morphological differences between these species from the *D. mazei* complex are as follows:

D. mcgintyi: the new species has a more distinct pattern than *D. mcgintyi*, the relative spire height is a little bit higher. The shells may tend to be twisted with a curved spire more often than in any other *Dalliconus* species. One major difference is in the number of tubercles on each whorl of the spire: the new species counts around 25 to 30 smaller nodules while *D. mcgintyi* counts around 20, giving a less

projecting appearance of the nodules in the new species. The spire of *D. mcgintyi* is somewhat straighter. Moreover the spiral ribs on the last whorl are less prominent, more numerous and somewhat less flat in the new species.

D. mazei: The new species is longer and more elongate than *D. mazei*, which body whorl has a higher gloss and is smooth in bigger shells or covered with low distinct spiral ribs with grooves between them conspicuously pitted in smaller shells. The body whorl is patterned with 8 to 10 rows of very distinct square reddish-brown spots. Whorl margins of *D. mazei* do not have projecting carinae and are flat instead of concave above in the new species.

D. roberti: Similar to *D. mcgintyi* and *D. edpetuchi* n. sp. in overall shape and size. However it has a shorter spire sculptured with axially elongated tubercles and it shows a more pronounced convexity on the posterior end giving the shell a bulging conical form. The body whorl has a densely packed pattern of yellow-brown spots.

D. coletteae: closest to *D. roberti* in shape but with a less elongated shell. It is smaller in size (from 19 mm. to 32.5 mm.) than the new species. It has a more sculptured body whorl with numerous deeply-incised spiral sulci. The pattern is made of scattered small orange brown flammules and spots and the sutural ramp is coloured with comma shaped spots that are diagnostic of the species. *D. edpetuchi* n. sp. is a much darker and more heavily patterned shell.

ACKNOWLEDGMENTS

The present description could not have been written without the help brought by the following persons:

Edward Petuch who provided us valuable informations on this difficult and very confusing genus. Michael Rabiller, curator of the Cone collection of MHNLR (La Rochelle) for the picture of the paratype 9 of the new species. Alexander Medvedev who provided us the picture of the paratype 8 of the new species. Alain Robin who photographed many of the shells pictured in this study.

Abbreviations

AMNH: American Museum of Natural History, New York City, New York, U.S.A.

MHNLR: Muséum d'Histoire Naturelle de La Rochelle, La Rochelle, France

MNHN: Muséum National d'Histoire Naturelle, Paris, France

SMNS: Staatliches Museum für Naturkunde, Stuttgart, Germany

FLMNH: Florida State Museum of Natural History, University of Florida, Gainesville, Florida, U.S.A.

USNM: Smithsonian Institution, United States National Museum, Washington, D.C., U.S.A.

SBMNH: Santa Barbara Museum of Natural History, Santa Barbara, California, U.S.A.

ANSP: Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania, U.S.A.

RMNH: Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands

EM: Eric Monnier

LL: Loïc Limpalaër

CR: Christophe Roux

DB: David P. Berschauer

EP: Edward Petuch

AM: Alexander Medvedev

BdM: Bob da Motta

GR: Georges Richard



Figure 4 – *Dalliconus rainesae*. 1: *D. rainesae* 15.5 mm, Florida, coll. EM; 2: *D. rainesae* 18.3 mm, Egmont Ref, Florida, coll. LL; 3: *D. rainesae* 15.3 mm, Egmont Key, Florida, JKT2472; 4: *D. rainesae* 16.3 mm, Dry Tortugas Keys Arch., Florida, coll. CR; 5: *D. rainesae* 19.4 mm, Florida, coll. EM

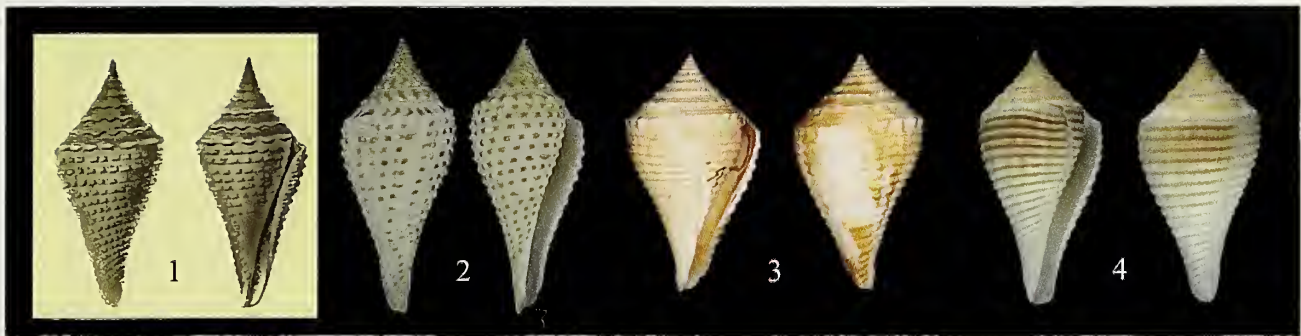


Figure 5 – *Dalliconus armiger* group. 1: *C. crenulatus* Kiener, 1845 Holotype, renamed *C. armiger* Crosse, 1858; 2: *D. armiger* (Crosse, 1858) 36.2 mm, ~ 80-120 m, Florida, coll. EM; 3: *D. bajanensis* (Nowell-Usticke, 1968) 31.0 mm Barbados, Lectotype AMNH 195451; 4: *D. guyanensis* (Van Mol, 1758) 28.4 mm Surinam, Holotype RMNH 106718

REFERENCES

- Abbott, R. T. 1954. *American Seashells*. Van Nostrand, New York, N.Y: 541 pp.
- Abbott, R. T., and S. P. Dance, 1982. *Compendium of Seashells*, E. P. Dutton, Inc., New-York, N.Y: 411 pp.
- Aitken, T. J., P. A. Mann, A. Escalona, and G. Christeson 2011. *Evolution of the Grenada and Tobago basins and implications for arc migration*. Marine and Petroleum Geology 28: 235-258 pp.
- Boxshall, G. A., et al. 2014. *World Register of Marine Species*.
<http://www.marinespecies.org>
- Cargile, W. P. 1998. *Description of Conus lenhilli, a new species from the western Atlantic*. Siratus 2(14): 18-23 pp.
- Clench, W. J. 1942. *The genus Conus in the Western Atlantic*. Johnsonia, 1 (6): 1-40 pp.
- Clench, W. J. 1953. *The genus Conus in the Western Atlantic*. Johnsonia, 2 (32): 363 - 376 pp., pls. 182-185.
- Clench, W. J., and R. C. Bullock 1970. *The genus Conus in the Western Atlantic*. Johnsonia, 4: 372-379 pp.
- Dall, W. H. 1889. *Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877-78) and in the Caribbean Sea (1879-80), by the U. S. Coast Survey Steamer "Blake", Lieut.-Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., commanding*. XXIX. Report on the Mollusca. Part 2, Gastropoda and Scaphopoda. Bulletin of the Museum of Comparative Zoology 18 (29): 1-492 pp., pls. 10-40.
- Deshayes, G. P. 1874. *Description d'un cône nouveau des Antilles*. Journal de Conchyliologie, Paris, France, 22: 62-66 pp., pl. 1
- Gracia, A., N. E. Ardila, and J. M. Diaz 2004. *Gastropods collected along the continental slope of the Colombian Caribbean during the INVEMAR-Macrofauna campaigns (1998-2001)*, Iberus, 22: 43-75 pp.
- Kaicher, S. D. 1976. *Card Catalogue of World-Wide Shells. Conidae Part I-IV*. Privately published.
- Kersten, P. H. 2014. *The Cone Collector's Guide*.
<http://theconecollector.com/checklist/Pages/>
- Kohn, A. J. 2014. *Conus of the Southeastern United States and Caribbean*. Princeton University Press, Princeton, New Jersey: 457 pp.
- Lozet, J. B., and C. Pétron 1977. *Coquillages des Antilles*. Editions du Pacifique, Tahiti: 138 pp.
- Marsh J. A., and O. H. Rippingale 1964. *Cone shells of the World*. The Jacaranda Press, Brisbane, Australia: 185 pp.
- Massemin, D., D. Lamy, J.-P. Pointier, and O. Gargominy 2009. *Coquillages et*

- escargots de Guyane (Sea Shells and snails from French Guiana)*. Publications Scientifiques du Muséum. Collection Parthénopé, Biotopé Editions: 455 pp.
- McGinty, T. L. 1953. *A new slender cone from the Gulf of Mexico*. Notulae Naturae of the Academy of Natural Sciences of Philadelphia, 249: 1-2 pp.
- Okutani, T. 1983. *Mollusks in: Crustaceans and Mollusks trawled off Suriname and French Guiana*, M. Takeda and T. Okutani, eds. Japan Marine Fishery Resource Research Center, Tokyo: 187-354 pp.
- Paulmier, G. 1994. *Mollusques profonds des Antilles Françaises*. Xenophora AFC Paris, 68: 3-4, 14, fig. 50.
- Petuch, E. J. 1987. *New Caribbean Molluscan Faunas*. The Coastal Education and Research Foundation. Charlottesville Virginia: 154 pp., 29 pls. + addendum, 2 pp., 1 pl.
- Petuch E. J. 1988. *Neogene History of Tropical American Mollusks*. The Coastal Education and Research Foundation. Charlottesville Virginia: 217 pp., 39 pls.
- Petuch, E. J. 2013. *Biodiversity and Biogeography of Western Atlantic Mollusks*. CRC Press. Boca Raton, Florida: 234 pp.
- Pilsbry, H. A. 1955. *Another Floridian Conus*. The Nautilus, 69: 47-48 pp.
- Pointier, J.-P. and D. Lamy 1998. *Guide des Coquillages des Antilles*. PLB Editions, Abymes, Guadeloupe: 225 pp.
- Puillandre, N., P Bouchet, T. F. Duda, Jr., S. Kauferstein, A. J. Kohn, B. M. Olivera, M. Watkins, and C. Meyer 2014. *Molecular phylogeny and evolution of the cone snails (Gastropoda, Conidae)*. Molecular Phylogenetics and Evolution. 78: 290-303 pp.
- Richard, G. 2009. *Conus roberti spec. nov., (Mollusca, Gastropoda, Conidae) de Guadeloupe, Antilles Françaises et le groupe « Fusiconus » dans la province Caraïbienne*. Annales de la Société des Sciences Naturelles de la Charente-Maritime, 9: 921-928 pp.
- Robin, A. 2008. *Encyclopedia of Marine Gastropods*. Conchbooks, Hackenheim, Germany: 480 pp.
- Röckel, D. 1982. *Conus mcgintyi*, Die Familie Conidae, N° 283.
- Röckel, D. 1984. *Conus rainesae*, Die Familie Conidae, N° 469.
- Sunderland, K., and L. Sunderland 1994. *Caribbean Conidae*, American Conchologist, 22 (1): 14-15 pp.
- Tryon, G. W., Jr. 1884. Conidae, Pleurotomidae. *Manual of Conchology, structural and systematic, with illustrations of the species*. Tryon, Philadelphia, 6: 1-413; pls. 1-31 (Conidae)
- Tucker, J. K. 2011. *The Cone Collector*, special issue # 14a: 165 pp.
www.theconecollector.com
- Tucker, J. K. 2013. *Cone Shells of Florida*. MdM Publishing, Wellington, Florida: 155 pp.
- Tucker, J. K., and M. J. Tenorio. 2009. *Systematic Classification of Recent and Fossil Conoidean Gastropods, with Keys to the Genera of Cone Shells*. ConchBooks, Hackenheim, Germany: 295 pp.
- Tucker, J. K., and M. J. Tenorio. 2013. *Illustrated Catalog of the Living Cone Shells*. MdM Publishing, Wellington, Florida: 517 pp.
- Van Mol, J. J. 1973. *Les Conidae du Surinam*. Zoologische Mededelingen, 46: 261-268 pp.
- Van Mol, J. J., B. Tursch, and M. Kempf 1967. *Mollusques prosobranches: Les Conidae du Brésil. Campagne de la Calypso au large des côtes Atlantiques de l'Amérique du Sud (1961-1962)*. Annales de l'Institut Océanographique (Monaco), 45: 233-255 pp.
- Walls, J. G. [1979]. *Cone Shells. A Synopsis of the Living Conidae*. T. F. H. Publications, Inc., Neptune City, New Jersey: 1011 pp.

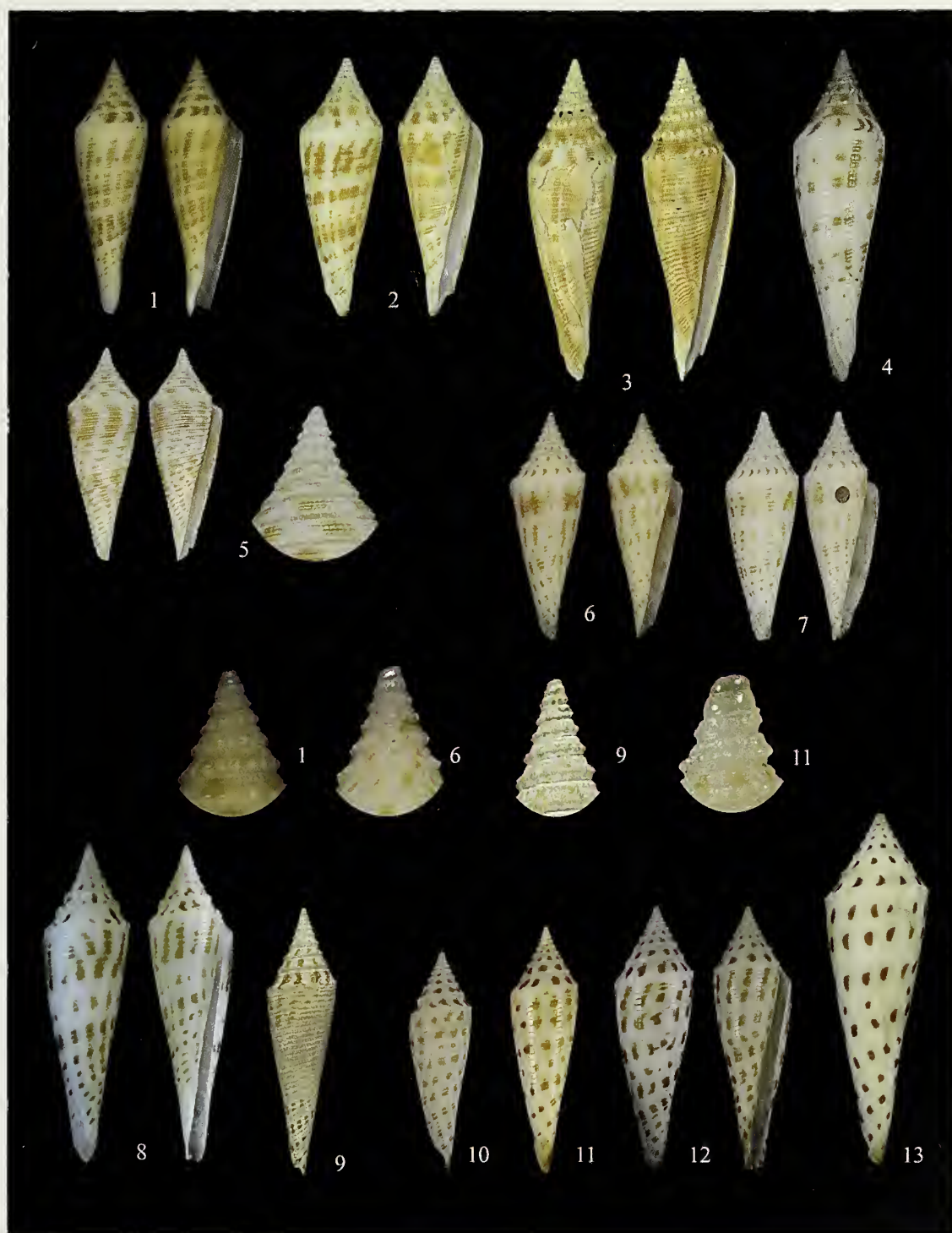


Figure 6 – *Dalliconus*. 1: *D. mcgintyi* 38.62 mm, - 200 m., W. Tampa, Florida, coll. CR; 2: *D. mcgintyi* 36.8 mm, - 201 m., 19°25'N, 95°57'W, Texas, JKT5137d; 3: *D. mcgintyi* 52.1 mm, - 221 m, Desoto Canyon, S. Pensacola, Florida, JKT1002; 4: *D. mcgintyi* 52.0, Florida, DM91208; 5: *D. mcgintyi* 21.7 mm, - 50 m., San Blas, Panama, coll. LL; 6: *D. colettiae* 19.9 mm, Coll. EM; 7: *D. colettiae* 20.6 mm, - 160 m., Barbados, coll. LL; 8: *D. roberti* 41.6 mm Guadeloupe, Private coll.; 9: *D. roberti* 36.6 mm Guadeloupe, coll. GR; 10: *D. mazei* 28.8 mm, Barbados, DM91211; 11: *D. mazei* 32.7 mm, - 80 m., Marquesas Key, Florida, SMNS ZI 91212, Coll. BdM; 12: *D. mazei* 35.3 mm, Tampa, Florida, Coll EM; 13: *D. mazei* 45.0 mm, Marie Galante, MHNLR Coll. GR



Figure 7 – *Dalliconus* Types. 1: *D. coletteae* Petuch, 2013, 20 mm, - 300 m., St. James, Barbados, Holotype FLMNH 328436; 2: *D. kremerorum* (Petuch, 1988) 18 mm, - 70 m., St. James, Barbados, Holotype USNM 859947; 3: *D. pacei* (Petuch, 1987) 19 mm, - 240 m., S. Grand Bahama Isl., Bahamas, Holotype USNM 859888; 4: *D. rainesae* (McGinty, 1953) 24.7 mm, - 60-80 m, N. E. Progreso, Yucatan, Mexico, Holotype FLMNH; 5: *D. sauros* (Garcia, 2006) 29.5 mm, - 140 m., SSE Port Aransas, Texas, Holotype; 6: *D. lenhilli* (Cargile, 1998) 39.8 mm, -440 m., Monchoir Bank, SE. Turks & Caicos Is., Holotype SBMNH 144485; 7: *D. mcgintyi* (Pilsbry, 1955) 41.6 mm, Pensacola, Florida, Holotype ANSP 193858; 8: *D. mazei* (Deshayes, 1874) 57.5 mm, - 90 m., Martinique, Holotype MNHN 3307; 9: *D. roberti* (Richard, 2009) 51.2 mm, - 100 m., Basse Terre, Guadeloupe, Holotype MNHN 21376